

REMARKS/ARGUMENTS

Claims 1, 2, 6 and 7 are pending herein. Claim 1 and certain paragraphs of the specification have been amended to correct typographical errors. Entry of the amendments to claim 1 and the specification after final rejection is proper under Rule 116 because the claim and specification amendments do not present new issues (i.e., the amendments simply correct obvious typographical errors) and the change to claim 1 brings that claim into compliance with §112, second paragraph, and thus places the application in better condition for appeal, if necessary.

Examiner Aguirrechea is thanked for courtesies extended to Applicants' representative (Steven Caldwell) during a telephonic interview on June 15, 2004. The substance of that interview has been incorporated into the following remarks.

In the March 23, 2004 Office Action, the PTO withdrew the §102(e) rejection over Mishra et al., but rejected claims 1, 2, 6 and 7 under §103(a) over Mishra et al. This rejection is respectfully traversed.

The PTO admits that Mishra does not disclose a FWHM crystallinity value of 90 arcsec or below, as recited in pending claims 1 and 6. The PTO is arguing, however, that "although Mishra does not disclose the claimed FWHM crystallinity values, one with ordinary skill in the art would be able to modify this value for an AIN film within the scope of the invention in order to provide a semiconductor film having a reduced dislocation density . . ." (see Office Action page 3). For the reasons discussed below, the PTO's position is not legally supportable and should be withdrawn.

The PTO has the burden of proving a *prima facie* case of obviousness. *In re Bell*, 991 F.2d 781, 783, 26 USPQ2d 1529, 1530 (Fed. Cir. 1993); *see In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). When "the difference between the claimed invention

and the prior art is the range or value of a particular variable, *then a prima facie rejection is properly established when the difference in range or value is minor*" (emphasis added). *In re Geisler*, 43 USPQ2d 1362, 1365 (CAFC 1997) (quoting *Haynes Int'l, Inc. v. Jessop Steel Co.*, 28 USPQ2d 1652, 1655 n.3 (Fed. Cir. 1993). A "claimed invention is rendered prima facie obvious by the teachings of a prior art reference that discloses *a range that touches the range recited in the claim*" (emphasis added). *In re Geisler*, 43 USPQ2d at 1365 (quoting *In re Malagari*, 182 USPQ 549, 553 (CCPA 1974).

There is no *prima facie* case of obviousness here since the PTO has failed to produce factual evidence indicating that the claimed invention is *prima facie* obvious. Mishra discloses means for reducing the dislocation density of highly dislocated semiconductor films (e.g., GaN films) formed on silicon or sapphire substrates (e.g., see Mishra column 6, lines 7-13). For instance, Mishra discloses that by adding interlayer structures during the growth of a GaN film on a silicon substrate, the FWHM crystallinity value of certain crystal planes can be reduced from 1300 to 800 (see, e.g., Mishra's Figs. 3-5 and the discussion in columns 2 and 6 of Mishra). In the case of GaN layers grown on sapphire, Mishra teaches that it is possible to reduce the FWHM crystallinity value down to around 400 for certain crystal planes (see, e.g., column 5, lines 28-29 of Mishra).

It is undeniable, however, that the lowest FWHM crystallinity value for any semiconductor film disclosed in Mishra is around several hundred arcsecs. Pending independent claims 1 and 6, however, recite an AlN film having a FWHM crystallinity value of *90 arcsec or below*. As discussed above, a *prima facie* rejection is properly established only when the difference in range or value between the claimed invention and the prior art is minor or touches the range recited in the claim. See *In re Geisler*, 43 USPQ2d at 1365. Applicants respectfully submit that Mishra's teaching of semiconductor film FWHM

crystallinity values on the order of several hundred arcsecs not only does not touch the range recited in pending claims 1 and 6, but is also not a minor difference in range or value between the claimed invention and the prior art. The PTO has simply failed to establish a *prima facie* case of obviousness, and thus the rejection should be withdrawn.

Moreover, following the reasoning in the Office Action that "one with ordinary skill in the art would be able to modify this value for an AlN film within the scope of the invention . . ." (emphasis added) to its logical conclusion would mean that disclosure of any FWHM value in the prior art discloses all subsequently developed FWHM crystallinity values. This is clearly inconsistent with the Federal Circuit case law discussed above. Indeed, U.S. law requires that skilled artisans, upon reading the Mishra patent, would have been motivated by the teachings of Mishra to adjust Mishra's FWHM crystallinity values to be within the claimed range, and not merely that one "would be able to modify" Mishra's FWHM crystallinity values to be 90 arcsec or below, as alleged on page 3 of the Office Action. The PTO's reasoning in the Office Action is simply without basis in fact, as there is no evidence of record that reducing Mishra's FWHM crystallinity values to be 90 arcsec or below would accomplish any benefit, let alone reduce dislocation density as asserted in Section 4 of the Office Action.

Furthermore, Mishra discloses that "although the present invention has been detailed with respect to GaN, equivalently, the present invention may be extended to apply to all group III-nitrides, aluminum-, gallium-, indium- and boron- (AlN GaN, InN, BN) and their alloys . . ." (see column 6, lines 17-19). Skilled artisans, therefore, would expect, if anything, that Mishra's interlayer growth method provides all group III nitrides, AlN or otherwise, with FWHM crystallinity values of around several hundred arcsecs. As such, notwithstanding that the PTO has provided no factual evidence showing that skilled artisans would even have a

reason to select AlN films from Mishra's laundry list of "all group III-nitrides," even if Mishra's FWHM crystallinity values were construed to be applicable to AlN films, there would still be no disclosure or suggestion in Mishra that the AlN films should have FWHM crystallinity values on the order of 90 arcsec or below, as claimed. Again, Mishra discloses that, in the context of Mishra's interlayer growth method, AlN films are equivalent to GaN films and that the FWHM crystallinity values should be around several hundred arcsecs. Should the PTO maintain this rejection in a subsequent Office Action, the PTO is challenged to cite to some factual evidence, as opposed to Examiner opinion and argument (which cannot take the place of such factual evidence), showing the reasons why skilled artisans would have been motivated to (i) specifically select AlN films from Mishra's laundry list of "all group III-nitrides" and (ii) then adjust the FWHM crystallinity value for the AlN film down to the very low value of 90 arcsecs or below, as claimed. Applicants respectfully submit that the record is devoid of any such factual evidence.

With respect to the claimed surface flatness value, a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation (see Manual of Patent Examining Procedure (MPEP) 2144.05 II(B)). The PTO admits that there is no disclosure in Mishra pertaining to the surface flatness of any semiconductor film layer, let alone that an AlN film (having the claimed FWHM crystallinity value) has a surface flatness of "20 Å or below," as claimed. The PTO further states on page 3 of the Office Action that "applicants have failed to disclose the importance of the surface flatness value." The burden is on the PTO, however, to first establish, in the context of the Mishra patent, that semiconductor film surface flatness is even a result-effective variable. For example, Mishra fails to even remotely discuss the surface

flatness of semiconductor films, let alone that any benefits are attributable to adjusting the surface flatness of a semiconductor nitride film to be within a specific surface flatness range. Within the context of Mishra, therefore, Applicants respectfully submit that semiconductor film surface flatness is not a recognized result-effective variable. This is yet another reason why the rejection based on Mishra should be withdrawn.

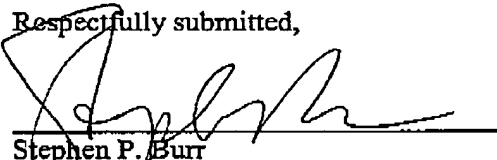
In view of all of the foregoing, reconsideration and withdrawal of the §103(a) rejection over Mishra are respectfully requested.

If Examiner Aguirrechea believes that contact with Applicants' attorney would be advantageous toward the disposition of this case, she is herein requested to call Applicants' attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,

6/23/04
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